soil
conservation
DEVOTED TO THE WISE USE OF LAND AND WATER RESOURCES

JANUARY 1968
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Strip mines

Streambanks

Roadsides

Three critical sediment sources

SOIL CONSERVATION SERVICE

U. S. DEPARTMENT OF AGRICULTURE

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soil conservation

DEVOTED TO THE WISE USE OF LAND AND WATER RESOURCES

COVER: A snow surveyor hikes on skis into the high mountain country of Arizona to measure the water content of the snowpack. The data will help SCS predict the amount of spring runoff.

Critical . . .

Much of the sediment pollution that fills and fouls our streams and lakes comes from a remarkably small part of the total landscape.

Small areas and narrow bands of land that suffer destructive disturbance and extreme erosion produce sediment in amounts out of all proportion to their size.

This issue of *Soil Conservation* calls attention to three types of critical erosion areas that are not yet effectively dealt with in the Nation's soil and water conservation efforts.

Surface-mine spoil: A recent national survey of surface mining focuses new attention on the land destruction and water pollution so often resulting from this important economic activity.

Our lead article by Darnell Whitt (p.123) gives us the benefit of insights into the problem he gained as a member of the working committee that prepared the report submitted to the President through the Secretary of the Interior (*Soil Conservation*, Oct. 1967, p. 69.)

Streambanks and roadsides: Especially difficult to deal with are the vulnerable thin lines of streambanks and roadsides that interlace the American landscape.

Agricultural Engineer R. C. Barnes, Agronomist B. D. Blakely, and Soil Conservationist Cal Roark collaborated on the two articles (pp. 126, 129) that summarize the conservation problems of these critical sediment sources.

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Surface-mined land

How much? What next?

By D. M. Whitt
Director, Plant Sciences Division, SCS

More than 3 million acres of surface-mined land in the United States has been disturbed by surface mining. About 2 million of this has been left to plague local communities with aggravating problems of soil erosion, sedimentation, water pollution, and scenic devastation.

However bleak the prospect may appear when the giant earthmoving machines move on, the future of strip-mined areas is not hopeless. They can be reshaped and restored to pleasing components of the landscape. The outwash of sediments and contaminants can be restrained. Reclaimed areas can be put again to productive and pleasurable uses.

For 30 years the Soil Conservation Service has been giving technical help to private landowners and to conservation districts in the stabilization and vegetation of surface-mined areas. Experience and information gained in that work combined with the findings of a national study just completed at the request of the Congress make clear five facts of great significance to rural America.

THESE ARE THE FACTS

(1) Most of the affected land is in private ownership.

(2) Land needing attention is present in all States, and most of it is in rural areas.

(3) Private landowners are doing something about the problem.

(4) Reclaimed areas can be put to a variety of beneficial uses.

(5) Greater efforts than in the past are needed to restore surface-mined land.

Strip-mined land, such as the coal cut in the upper right, in many cases can be reclaimed and returned to productive use as the pasture below.

The national study was made at the direction of the Congress in Public Law 89-4. Several Federal departments and agencies participated under the leadership of the Department of the Interior, with the Soil Conservation Service and the Forest Service representing the Department of Agriculture. The report was transmitted by the President to the Congress on July 3, 1967. Here in brief are the significant facts about surface-mined land in the United States.

As of January 1, 1965, an estimated 3.2 million acres of land had been disturbed by surface mining. Of this amount, around 2 million acres was in need of conservation treatment and rehabilitation.

About 91 percent of the affected acreage is in private ownership, and nearly half of that is in small scattered ownerships. These smaller tracts can best be treated as part of the total conservation management of the farms or other ownership parcels of which they are a part.

The table is from the report of the national study, *Surface Mining and Our Environment*, by the U.S. Department of the Interior.

All States have land that has been affected by surface mining. The study showed, however, that surface-mined land conservation is a *rural* opportunity.

More than 80 percent of the mined land surveyed was a mile or more from towns of 200 or more people. About 40 percent of the mined land was more than 5 miles from towns of this size.

About one-third of the land disturbed by surface mining has been rehabilitated. Some of this was restored by natural seeding, but more than half was treated through the efforts of private owners.

Soil and water conservation districts have been active in restoration of surface-mined areas. Information developed in the national study showed that 127,747 acres of surface-mined land was successfully treated in 300 conservation districts in 5 years, 1960-64. This work involved 5,255 district cooperators in 31 States.

During the same period, State forestry agencies, in cooperation with the U.S. Forest Service, provided assistance for restoring 36,710 acres of surface-mined land.

Mining firms have greatly increased their conservation efforts in recent years. Surface-mine operators in 22 States have formed the Mined Land Conservation Conference to bring about restoration of mined land. In addition, associations have been formed for this purpose in several States.

Associations in the Appalachian Region have been responsible for reforestation and seeding of 74,000 acres.

The National Sand and Gravel Association reports that its members rehabilitated more than half of the acreage they mined in 1965. Two years earlier, they treated only one-fourth of the total acreage disturbed.

Restored surface-mined land can serve several useful purposes. A survey in 1966 by the SCS in 14 States in all parts of the country showed that the greatest potential uses were woodland production and wildlife habitat.

Status of land disturbed by strip and surface mining in the United States as of January 1, 1965, by State
(Thousand acres)

State	Land requiring reclamation [1]	Land not requiring reclamation [1]	Total land disturbed [2]
Alabama	83.0	50.9	133.9
Alaska	6.9	4.2	11.1
Arizona	4.7	27.7	32.4
Arkansas	16.6	5.8	22.4
California	107.9	66.1	174.0
Colorado	40.2	14.8	55.0
Connecticut	10.1	6.2	16.3
Delaware	3.5	2.2	5.7
Florida	143.5	45.3	188.8
Georgia	13.5	8.2	21.7
Hawaii	(3)	(3)	(3)
Idaho	30.7	10.3	41.0
Illinois	88.7	54.4	143.1
Indiana	27.6	97.7	125.3
Iowa	35.5	8.9	44.4
Kansas	50.0	9.5	59.5
Kentucky	79.2	48.5	127.7
Louisiana	17.2	13.6	30.8
Maine	21.6	13.2	34.8
Maryland	18.1	7.1	25.2
Massachusetts	25.0	15.3	40.3
Michigan	26.6	10.3	36.9
Minnesota	71.5	43.9	115.4
Mississippi	23.7	5.9	29.6
Missouri	43.7	15.4	59.1
Montana	19.6	7.3	26.9
Nebraska	16.8	12.1	28.9
Nevada	20.4	12.5	32.9
New Hampshire	5.1	3.2	8.3
New Jersey	21.0	12.8	33.8
New Mexico	2.0	4.5	6.5
New York	50.2	7.5	57.7
North Carolina	22.8	14.0	36.8
North Dakota	22.9	14.0	36.9
Ohio	171.6	105.1	276.7
Oklahoma	22.2	5.2	27.4
Oregon	5.8	3.6	9.4
Pennsylvania	229.5	140.7	370.2
Rhode Island	2.2	1.4	3.6
South Carolina	19.3	13.4	32.7
South Dakota	25.3	8.9	34.2
Tennessee	62.5	38.4	100.9
Texas	136.4	29.9	166.3
Utah	3.4	2.1	5.5
Vermont	4.2	2.5	6.7
Virginia	37.7	23.1	60.8
Washington	5.5	3.3	8.8
West Virginia	111.4	84.1	195.5
Wisconsin	27.4	8.2	35.6
Wyoming	6.4	4.0	10.4
Total	2,040.6	1,147.2	3,187.8

[1] Compiled from data supplied by Soil Conservation Service, U. S. Department of Agriculture.

[2] Data compiled from reports submitted by the States on U. S. Department of the Interior form 6-1385X, from Soil Conservation Service, and estimates.

[3] Less than 100 acres.

A one-time sand and gravel pit in Kansas now is a 30-acre lake providing boating, swimming, and fishing, with pleasant picnic facilities on the shore.

More than a fourth of the land disturbed by surface mining has a potential for farm and forest recreation. Smaller percentages of the affected areas have potential for cropland, residential, institutional, or industrial uses.

Many of the restored sites have the potential for multiple uses. The sum of the acreages reported for the various uses in the survey exceeded the total area of the sample by 65 percent. They were:

Potential use	Percent of disturbed areas
Woodland	39.2
Wildlife habitat	38.6
Farm and forest recreation	27.2
Pastureland	17.8
Rangeland	13.3
Ponds and reservoirs	9.9
Residential, institutional, and industrial	6.5
Cropland	3.4
Other (unspecified)	8.6
Total	164.5

Our Nation's increasing requirements for land and water make it imperative that attention be given to areas affected by surface mining. Fortunately, much is known about how to make mining and later uses of the land compatible. Greater cooperative efforts by Government, private landowners, and the mining industry are needed.

Some necessary features of restoration and conservation efforts on surface-mined land indicated by the national study and the experience of the Soil Conservation Service are:

(1) Federal agencies should demonstrate leadership by restoring the surface-mined lands they administer, with a view to completing the job within 10 years. The Forest Service is already making headway in rehabilitating mined land on the National Forests.

(2) Well-planned operations and good mine housekeeping with a view to prompt restoration should be the publicly announced policy of every mining firm.

(3) A program of Federal technical and financial aid should be provided to accelerate treatment of old mined areas to eliminate sources of water pollution and other damaging effects.

The program should be coordinated with activities of soil and water conservation districts, the mining industry, States, and municipalities, on watershed-wide plans of appropriate scale. Restoration measures should be included in the conservation plans of the individual landowners.

(4) Federal and State agencies and local conservation districts should work with the mining industry to develop mutual confidence and trust, to develop workable mining standards, to encourage planning of restoration measures as an integral part of the mining operation, and to disseminate technical information as it is developed.

(5) Research programs, studies, and field demonstrations should be expanded. Although much information is available, many problems of treating mine spoil have not been solved. Many opportunities for making surface-mined lands an asset to the community have not been realized.

Surface-mined lands properly restored can add greatly to the quality of man's environment. It is essential to remember, however, that these lands are not isolated. They are an integral part of the drainage areas in which they are located, and their restoration and conservation treatment can be accomplished most effectively and efficiently as part of the total soil and water conservation program already underway on privately owned lands. ♦

Streambank erosion

A widespread problem too big for a landowner to handle alone

By R. C. Barnes, Jr.
Agricultural engineer, SCS, Washington, D. C.

Streambank erosion is a major problem along many miles of the Nation's rivers and streams.

It is estimated that there are 300,000 miles of streambanks in the United States subject to erosion and producing about 500 million tons of sediment each year.

Removal of sediment from stream channels, harbors, and reservoirs is costing about $250 million a year. Loss of land adjacent to stream channels is valued at about $11 million annually.

Streambank erosion is a continuous problem on constantly flowing streams, although it may vary in intensity throughout the year. On intermittent streams, erosion occurs each time floodwater flows down the stream channel.

Damage is increased by waterborne ice or debris. The problem is aggravated by poorly placed manmade structures, overgrazing, and other factors that affect runoff and streamflow.

The damage is evident in many ways: in undercut streambanks, caving and sloughing of adjacent land, and loss of crops and of buildings, fences, and other physical improvements. It shows in the raw scars left to mar the beauty of the surrounding landscape.

An expensive problem

One of the end products, and a costly one to man, is the sediment produced by streambank erosion. This sediment fills streams, waterways, and harbors; increases flooding; smothers crops; and spoils the habitat for fish and wildlife.

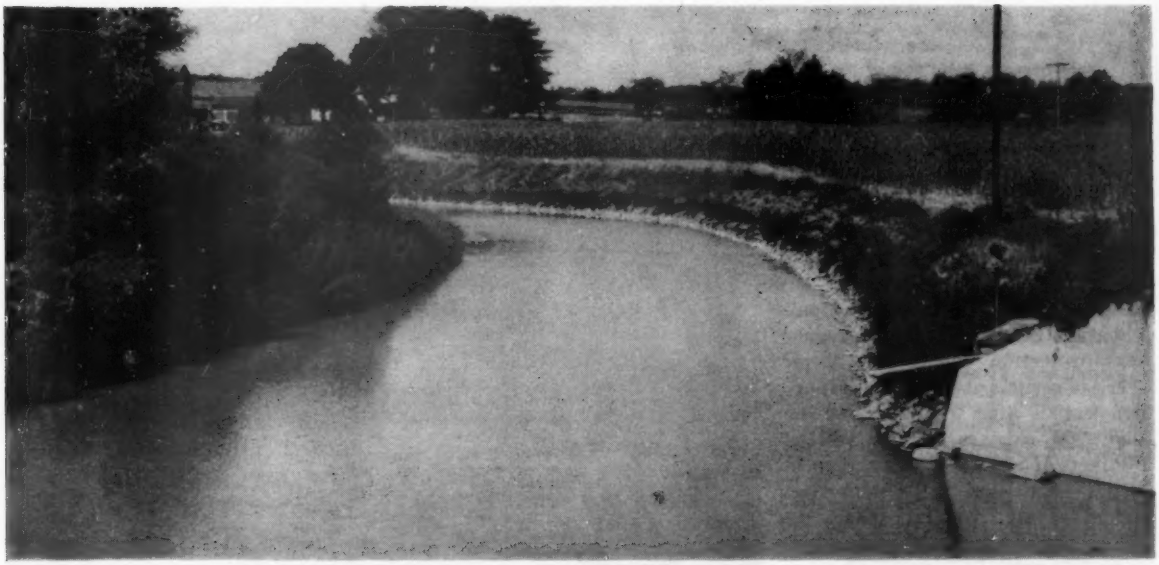
Sediment affects municipalities by increasing the cost of filtering and processing water for municipal and industrial use, causing extra wear on pumping equipment, and creating the need for extra maintenance of roads, bridges, parks, and related facilities.

A survey report, "Conservation Treatment of the Dry Creek Watershed, Sonoma and Mendocino Counties, California," estimates that the sediment produced from streambank erosion in the 313 miles of tributaries in the watershed, with a drainage area of 130 square miles, amounts to about 164,000 tons annually. It is further estimated that, with proper treatment of the streambanks where needed, this amount could be reduced by 74 percent to about 39,000 tons a year.

Streambank erosion - control methods must vary with different conditions. In humid areas, control of live streams is mainly by the use of vegetation supplemented by mechanical measures. In semiarid and arid areas, protection is primarily by mechanical means.

Control methods

Mechanical erosion-control measures usually fall into two general classes: (1) Those which retard flow along the bank and promote



With the bank sloped and the lower part protected by rock riprap, this section of Buffalo Creek in New York is being stabilized with vegetation. The costly effects of streambank erosion are illustrated (opposite page) on a farm in Louisiana where the Red River cuts away a strip of land 200 feet wide in 3 weeks.

Group projects and cost-sharing get the job done

deposition, and (2) those which form a cover and protect the bank from direct action of the current.

Permeable jetties constructed of piling, rock, trees, or other materials are examples of protection causing deposition. Jetties may be designed either to deflect the current away from the bank or to reduce its velocity adjacent to the bank to a degree that erosion is halted.

Living vegetation, brush matting, rock riprap, concrete, and asphalt linings are examples of protective bank cover.

Streambank-erosion control usually requires group action by the landowners affected, since the problem extends beyond any one owner's control.

The Soil Conservation Service provides limited technical assistance through soil and water conservation districts for streambank-erosion control as a part of regular conservation operations.

SCS also provides technical and financial assistance to individuals and groups of landowners to treat streambanks in approved watershed projects. The Buffalo Creek Project in western New York is an example of what can be done with adequate planning and installation through project action.

Project action

Buffalo Creek watershed covers an area of 437 square miles. The problem was mainly erosion of roads and farmland and of streambanks. The resulting sediment was being deposited in Buffalo Harbor where it interfered with shipping and had to be removed at great expense. This public damage justified Buffalo Creek as one of 11 flood-prevention watersheds authorized by the Flood Control Act of 1944. The sponsor was the Joint Board—Erie Wyoming Soil and Water Conservation District.

Stabilization work on Buffalo Creek consisted generally of bank-sloping, riprapping the lower toe of the slope, and planting the upper bank to adapted grasses and shrubs. Some 59 miles of channel were treated.

A study by the Agricultural Research Service showed that the amount of sediment that had to be removed from Buffalo Harbor was reduced by 24 percent by 1963, when 75 percent of the project was completed. Studies are continuing since completion of the project.

Teamwork by landowners

The teamwork approach in stabilizing streambanks is also being used by landowners using their own funds supplemented by cost-sharing from other sources. For example, cooperators of the Little Snake River Soil and Water Conservation District, Wyoming, are making use of technical help from the Soil Conservation Service and financial aid from the Agri-

Rock riprap is being laid at the base of a section of Buffalo Creek, N. Y., after bank sloping (upper). Vegetation alone has stabilized the sloped banks of Stillwater Creek in Kentucky (middle).

cultural Stabilization and Conservation Service. Timely streambank-protection measures there averted serious damage to irrigation canals that carry water to about 60 ranches in the valley. Blankets of trees or rocks and rock jetties were used to keep erosive currents away from the banks.

The Agricultural Stabilization and Conservation Service gave financial assistance to 3,623 streambank-stabilization projects in 1966. SCS reports indicate that treatment was accomplished on 469 miles of eroding streambanks.

When compared with the total job to be done, the rate of accomplishment is much too slow.

At the present rate of treatment, it will require some 600 years to treat the Nation's eroding streambanks. Methods of controlling streambank erosion are known. The costs are high and generally beyond the means of individuals or groups. Broad public interest is involved where erosion occurs along streambanks. This problem requires additional governmental action in cooperation with private landowners if it is to be solved. ♦

A combination of heavy boulders and vegetation (right) were used to tame a cutting bend in a western stream, the White River in Rio Blanco County, Colo.

Roadside conservation

We've made a good start, but much remains to be done on our most-public land areas

By B. D. Blakely and Cal L. Roark
Head agronomist, Plant Sciences Division, and soil conservationist, Resource Development Division, SCS, Washington, D. C.

Probably more people see soil conservation work done on and along highway rights-of-way than on all other lands combined. They also see the scars of erosion on unprotected cuts and fills and the deepening gullies in neglected roadside ditches where modern conservation measures have not been used.

For roadsides are the most public segments of the American landscape, and roadside erosion is one of the Nation's most widespread conservation problems.

There are nearly 3.2 million miles of roads in rural America, and the mileage gets bigger every year. Most of these roads require vegetation on the shoulders, cuts, and fills. In addition, engineering structures are needed in many places to retard runoff from the areas above the rights-of-way and to provide safe drainageways.

Doing better now

Fortunately, most new highways constructed with Federal assistance or by State highway departments are of good design and are accompanied by adequate treatment of disturbed areas and drainageways for erosion control. But hundreds of miles of older highways have active erosion in roadside ditches and on cut banks. And uncounted thousands of miles of secondary and local roads are critical sediment sources and a hazard to adjoining farmlands.

It is estimated that eroding roadsides discharge 56½ million tons of sediment annually into the Nation's streams, reservoirs, and harbors.

The Soil Conservation Service since 1935 has actively cooperated with local, State, and Federal highway agencies throughout the country to correct roadside erosion problems. This effort started in the early days of the CCC camps, continued in the erosion-control demonstration projects and has steadily progressed through the operations of soil and water conservation districts.

More recently, provisions for stabilizing roadsides have been an important part of many small watershed projects under Public Law 566 and currently are a feature of resource conservation and development projects.

In these projects, Federal funds are used to help defray the cost of erosion-control measures on roads which, if left in their present state, would continue to pour sediment into streams and impoundments.

In the Coosa River watershed in Georgia more than 600 miles of roadside have been stabilized as part of the flood-prevention project. In the 46 small watershed projects in that State, more than 1,200 miles of roadside have been treated, with the counties providing labor and equipment.

In less than 3 years, the Gwinnett County RC&D Project in Georgia has stabilized more than 250 miles of roadside.

Miles of progress

Treatment of roadsides as critical erosion areas has been an important feature of small watershed projects in South Carolina and Tennessee, among other States. In South Carolina, 13 of 21 operating small watershed projects include plans for treating 221 miles of roadside as critical sediment sources. By the end of the 1967 fiscal year, treatment had been completed on 125 miles of roadside. In Tennessee projects, 119 miles of

Modern machinery has made rapid seeding, fertilizing, and mulching of steep slopes possible.

roadside treatment had been completed of 162 miles planned.

While much has been done in watersheds and RC&D projects, there is still a much bigger job along the roads outside of these authorized areas. Farm-to-market roads comprise a major part of the total highway mileage of the United States. On these roads the total cost for erosion control is borne by the counties and townships.

Counsel and guidelines

SCS assistance in the enormous task of stabilizing and beautifying roadsides has ranged from technical consultive service to the making of onsite investigations and preparing guidelines for use by highway engineers.

According to the needs in each case, SCS has provided recommendations for establishing vegetation, designs of erosion-control structures, and detailed soil survey information. All of the work has been in cooperation with soil conservation districts.

Highway engineers have used soil maps and information provided by SCS as a guide for locating highway routes and finding suitable fill material and gravel beds. Soils information provides clues as to the stability of the soil under heavy traffic, susceptibility to frost heaving, and the character of underlying material. Soil surveys provide valuable information regarding adaptability of plants and the requirements for ground cover.

Over the years SCS, through its plant materials centers and working with State highway commissions, has planted thousands of acres of grasses, legumes, vines, shrubs, and trees along highways to determine their value for specific roadside conditions. Plants were needed to meet special requirements of highway protection, including low maintenance cost, quick establishment, and, in the North, the ability to survive the toxic materials used on icy pavements. The results of the trials have been the basis of guidelines for highway plantings throughout the country.

Examples across the Nation

Road authorities at all levels now are recognizing the need for thorough and effective treatment in the interest of good road maintenance, traffic safety, economy, and beautification.

The Virginia Highway Department annually earmarks funds for stabilization of sediment-contributing roadsides. The cooperation of State highway officials in watershed projects is an outgrowth of memorandums of understanding between soil conservation districts and the Highway Department signed in the 1940's and 1950's.

The Montana Legislature passed that State's Highway Seeding Law in 1961. The SCS State soil conservationist was named chairman of the Highway Seeding Committee. Representatives of SCS and the highway department make onsite inspections and draw up recommendations for seeding to be done by contractors.

In New Mexico, the highway commission annually provides funds for SCS technical assistance under a working agreement between the two agencies. Such assistance includes selection and development of plants for stabilization and beautification and consultive services by SCS on other erosion-control measures.

In South Carolina, the work of the State Highway Department and SCS in roadside conservation has been so outstanding that the Legislature passed a resolution in 1962 commending the two agencies.

(Continued to p. 136)

Road cuts left uncovered can lose more than 100 tons of soil per acre a year.

Anyone for jacks? . . .

Angle-iron structures tame river current

Patterned after a child's plaything, the jacks anchored near the bank still the stream's flow.

By Ronald P. Church
Work unit conservationist, SCS, St. Joseph, Mich.

By dressing up the old game of jacks with some No. 6 galvanized wire, ¼-inch angle iron, and ¾-inch cable, SCS engineers in Michigan have found a way to beat old man river at his own game of streambank erosion.

Undercutting of a 600-foot section of St. Joseph River bank has been halted by installing a system of jacks to slow the current.

For many years, the late Cecil Potts tried to protect this section on his farm from damaging currents, high water, and ice by using concrete and riprap. But the river continued to cut away about 10 feet of land a year.

As a cooperator with the St. Joe River Soil Conservation District, he turned to the SCS office at St. Joseph and received technical help in developing a complete conservation plan.

SCS engineers recommended that Mr. Potts use a system of jacks similar to the type of installation used effectively in several Western States. This was one of the first attempts to use jacks in a Michigan stream.

Since the St. Joseph River is a navigable stream, Mr. Potts first obtained approval from the U.S. Army Engineers to install this work of improvement.

The jacks were made from pieces of 4x4x¼-inch angle iron 16 feet long bolted together at the middle. Then 365 feet of No. 6 galvanized wire was strung between the arms of each jack. A crane placed them on the river bottom where it meets the bank.

The jacks were tied together with two strands of ¾-inch cable and secured to buried railroad ties at four places along the riverbank and protected by a rock jetty at the upstream end of the system.

Installation cost was about $5.50 per lineal foot.

In the past, soil from this area washed downstream, plugged the river channel where it was deposited, and caused the current to shift and erode other areas. The river carried finer soil particles farther downstream to increase the pollution problem.

Other conservation practices, such as sloping and seeding, rock riprap, and rock or willow jetties, can be effective, depending upon the soil type, depth of water, direction of current, and cost of materials at each location.

But after watching the effect of this system of jacks for the past 3 years, both the present farm operator, Mr. Mike Koebel, and SCS personnel are convinced that many other opportunities exist for the use of jacks where streambank erosion is a serious problem in this part of the country. ♦

Iron jacks protect a river bank in Berrien County, Mich. Note the ripples of the current only to the right of the barrier.

Regulation, technical aid, and cooperation . . .

One State's answer to strip mining

By Robert E. Quilliam
State conservationist, SCS, Morgantown, W. Va.

A surface-mining act passed by the West Virginia Legislature has boosted surface-mining restoration by stepping up team work in a cooperative program that has been in operation for nearly 10 years.

The 1967 revision of the Strip Mine Law lays down standards that improve the quality of grading and permits better water control and discharge.

New standards include a reduction in the permissible height of the vertical walls of a cut or pit, a limit on the amount of material that may be pushed over the edge of the hill, and requirements for covering toxic materials, all of which increase the effectiveness of replanting operations.

The new law also authorizes the Department of Natural Resources to reject an application for a permit to mine if extreme damage to the landscape may result.

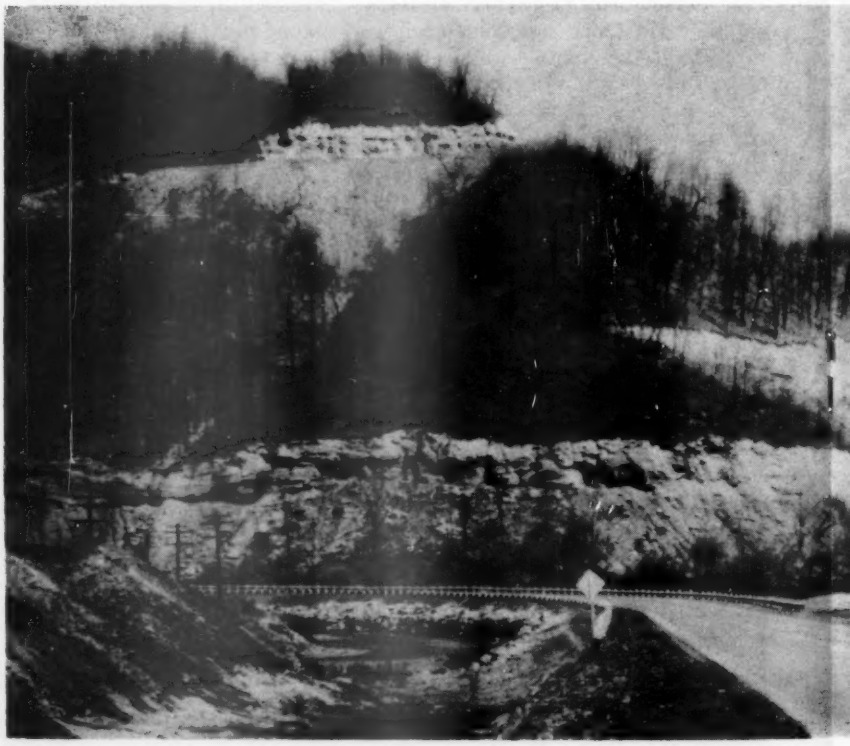
The current program began in 1958 when the State Legislature permitted surface-mine operators to transfer responsibility for revegetation to soil conservation districts. This plan allowed the districts to accept contracts from the operators.

During the intervening decade, the State Department of Natural Resources, the State Soil Conservation Committee, and the several local soil conservation districts, have worked closely with the Soil Conservation Service and the West Virginia University Agricultural Experiment Station in the mobilization of technical services to guide the restoration work. The annual rate of planting reached 8,057 acres in the spring of 1967, and plans are made to greatly increase this amount in 1968.

The districts call upon the technical assistance of Soil Conservation Service to prepare conservation planting plans. SCS, with the aid of information obtained from a 6-year study of strip-mine spoil planting trials, and the help of the West Virginia University Agricultural Experiment Station personnel, developed a plant adaptation guide for classifying soil materials. Field studies and experience show that for successful plantings the selection of appropriate trees, shrubs, grasses, or legumes must be based on soil type, acidity, stoniness, and the severity of the slope.

In addition to classifying sites, SCS prepares revegetation plans and provides some of the technical assistance needed to carry out the plans. To date, more than 2,100 conservation plans for revegetation have been prepared.

Since the original planting guide was established, recommendations for adapted plants have been revised and improved on the basis of field studies and the evaluation of plant performance over a 10-year period. Sixty-eight trial



Mine spoil (left) has been leveled, fertilized, and seeded. Scotch, white, and red pine (center) average 4 feet high 6 years after planting.

planting sites containing 190 species of woody and herbaceous plants have been used by the Soil Conservation Service to find best plants for revegetating mine spoil.

Black locust is used more extensively than any other woody plant. It has performed well as a first-step pioneer in the reestablishment of native climax species through natural means. Black locust also improves wildlife habitat and stimulates herbaceous plants.

Other woody plants used for revegetation are autumn-olive and Virginia, shortleaf, Scotch, white, and red pines. Grasses and legumes are used on the more gentle slopes or in combination with woody plants.

Soil conservation districts have demonstrated that they are fully capable of carrying out a revegetation program. They have successfully marshaled the needed manpower and equipment and obtained and handled planting stock, seeds, fertilizer, and lime. They have also solved problems of transportation, training of people, and supervision of work crews.

Especially important to West Virginia, the only State entirely within the Appalachian Region, is the employment provided to local citizens through the mine-restoration work of conservation districts. Planting crews of men, who were formerly unemployed or underemployed, now earn almost $100,000 a year. During the past years, employment rose from 367 men in 1965 to 615 in 1967. And the work to be done in 1968 is expected to break all previous records.

Since commercial strip mining first began to lop off mountain tops back in 1938, West Virginians have been concerned about how to have the products of mining without permanent damage to their other natural resources. The answer, slow to come, is a well-balanced team.

Through the cooperation among public agencies, mine operators, and others in West Virginia, the State now has an effective reclamation program with a promising future. ♦

Unsightly stripped areas and spoil banks (left) pollute a roadside stream.

A planting of black locust and sericea lespedeza has stabilized a steep overcast slope.

A tale of five persimmon trees

Max Strom stands before one of the five remaining persimmon trees left at the request of Hugh Bennett.

"Leave those persimmon trees. When times get hard, you'll always be able to get a 'possum out of them."

This was the admonition of Dr. Hugh Bennett as he talked with Max Strom, a supervisor of the Gadsden Soil and Water Conservation District in Florida following a conservation demonstration tour of Mr. Strom's 320-acre corn and shade tobacco farm.

That day was many years ago when the conservation effort in Florida was in its infancy, and the driving force of Hugh Bennett's enthusiasm was coaxing a national movement into action. At this meeting Bennett met a man whose enthusiasm for soil and water conservation matched his, and the farm today shows the fruits of that love of the land.

Bennett was referring to several wild persimmon seedlings growing in the fencerows of otherwise well-kept fields. Max Strom had said that as soon as some of the hands had time away from their regular chores, he'd have the sprouts grubbed out.

Instead, Strom took the Chief's advice and left the trees. Through the years, as the conservation farm plan required realinement of the fences, he fenced around the trees. None was ever cut, but today only five remain; the rest have died of old age.

Max Strom not only followed Dr. Bennett's advice about the trees, but he has become an ever stronger supporter of soil and water conservation. His farm is a picture of what conservation will do on the rolling clay hills of north Florida.

Max now proudly points out that the fourth generation of Stroms is beginning to work this land—a heritage of conservation passed on from generation to generation. ♦

Lessons in hydrants and dandelions

The most valuable "equipment" to carry on an effective outdoor conservation program is a teacher who knows how to open the door. It doesn't take dollars to establish an outdoor conservation laboratory; it just takes common horse sense.

For example, hydrants in the city usually have moisture at their bases where grass can be found, perhaps even dandelions. Many things can be learned from an old fireplug, such as:

Where does the water in the hydrant originate?
Why do we have hydrants?
Where did the dandelion come from?
Why is the grass green?
What happens to dandelions in winter?

Children, especially, must be led to discover—be stimulated to inquire—and helped to develop a sense of wonder. We must begin with the kindergarten and increase this type of teaching to develop informed adults.

Sometimes we have a tendency to think that it takes acres and acres of field and forest to teach ecology and conservation properly, but the truth of the matter is that all this can be accomplished within a limited area. Remember, "in most schools it should be necessary to travel no more than three times the length of a desk in order to see examples of many things that are worth observing."

Our natural resources are endangered; let's train the coming generation so they can make amends for our mistakes.—Mercer County Soil Conservation District Newsletter, *Trenton, N. J.* ♦

Now, that's a switch . . .

Names replace numbers on watershed lakes, as projects honor leaders

At a time when we see numbers replacing our names on bank accounts and payrolls, in addresses and phone books, names are replacing anonymous numbers to designate small watershed reservoirs or lakes in many parts of the country.

The names usually honor individuals who gave leadership in the project, or otherwise won recognition in the community.

Take Lake Martha, for instance. This beautiful reservoir in the Buntyn Creek Project, in the Tallahatchie Soil Conservation District, is the only watershed reservoir in Mississippi to be named for a woman.

Martha, wife of W. P. Rainey, a commissioner of one of the sponsoring districts, wouldn't let the men quit when they became discouraged because easements were hard to get.

"She ran a country store here," says Otey J. Sherman, a neighbor. "With groceries she dispensed encouragement. When she collected her accounts, she collected easements. She, more than anyone, put the project over. That is why I named the lake, which is mostly on my land, for her."

"Martha Rainey earned the right to be honored," said Sherman, who erected a sign to proclaim the name he had given the reservoir. "But even if she hadn't, I would like to see the lake carry a name other than 'Site Four,' or whatever it is called on the watershed plan."

Charles C. Snapp is a dreamer who lives by the side of the road and watches the race of men go by—quite literally. Many of them stop, too, for he operates a popular motel and restaurant at Walnut Ridge, Ark., on the main highway between Little Rock and St. Louis. He finds time to put his dreams into production.

As a member of the Arkansas Game and Fish Commission, he saw the recreation possibilities of part of the Lawrence County Soil and Water Conservation District. He got the wheels rolling. Later, as a member of the district board, he saw his dream come true.

Now the Flat Creek Watershed Project boasts one of the finest multipurpose developments in the State, and the first with major contributions from several State and Federal agencies and the local people. The largest reservoir—600 acres—and the 80-acre recreation area on its shores are named Lake Charles for him.

Marlow, Okla., now has a new water supply because its mayor, the late J. W. Taylor, served coffee and conservation over the counter of his restaurant.

"I think we voted for the project in self-defense," said Horace Wood, another businessman. "He called it 'our Marlow lake,' but there was so much of J. W. in it that we couldn't name it anything but Lake Taylor." The reservoir is a multipurpose structure on Rush Creek, a subwatershed of the Washita River Flood Prevention Project, in the Grady County

Otey Sherman named the watershed lake on his land for his neighbor, Mrs. Martha Rainey, who helped in securing easements for the project in the Tallahatchie Soil Conservation District, Mississippi. A sign (right) honors the Mayor of Marlow, Okla., who marshaled support for the lake that now bears his name.

Soil and Water Conservation District.

Two large reservoirs, Lake Fuqua and Lake Humphreys, near Duncan, Okla., in the Stephens County Soil and Water Conservation District, have been named for two prominent businessmen who were responsible for much of the successful watershed activity in the area. Both men spent much time and money to see the watershed program of the Wildhorse watershed, a subwatershed of the Washita River Basin, to a successful fulfillment.

Nolan J. Fuqua, a former president of the National Association of Soil and Water Conservation Districts, and "Watershed Man of the Year" in 1964, is chairman of the Stephens County Soil and Water Conservation District board of supervisors, and executive director of the National Soil Conservation Districts Foundation.

Lawrence J. Humphreys is board chairman of the Security National Bank of Duncan.

Dr. Church Lake is the name of a multiple-purpose reservoir on the 175,360-acre Fourche Maline Creek watershed which stores water for the city of Wilburton, Okla. Dr. Church, a dentist and rancher at Wilburton, has been a member of the Latimer County Soil and Water Conservation District board of supervisors since 1952, and is also immediate past chairman of the Oklahoma Water Resources Board. ♦

Boys Town wins 1967 State farm award

Soil and water conservation work on the farm at Boys Town, Nebr., has won for the institution the top place among the 1967 Award Farms in the statewide program sponsored annually by the Nebraska Association of Commerce and Industry.

Each of Nebraska's 86 soil and water conservation districts participate in the program by submitting a colored aerial photo of a district award winning farm. Boys Town won in the Douglas Soil and Water Conservation District in 1966 and in the State in 1967. Below is the presentation photo.

Boys Town conservation work was described in the May 1967 issue of *Soil Conservation.* ♦

Roadside conservation

(Continued from p. 130)

A recent development at the national level is a cooperative effort between SCS and the Bureau of Public Roads under the Federal Highway Act of 1966. SCS has assisted the Bureau in developing guidelines for minimizing soil erosion from highway construction.

A joint effort of county representatives of the Extension Service, vocational agriculture teachers, the State conservation department and highway commission, and SCS is putting a selective brush management program into effect in Wisconsin. This program started in 1965 and is the result of a study of right-of-way management in Columbia County. The objectives of the program are to control erosion and improve scenic values and habitat for wildlife and beneficial insects. To date, 80 miles of roadside have been treated in 35 soil conservation districts. Nineteen different organizations, including State and local government agencies, public utilities, and private commercial concerns, have participated in the cooperative project.

The progress made by local, State, and Federal authorities during the last 10 to 15 years in stabilizing roadsides has contributed much to reducing the sediment and debris reaching the Nation's streams and lakes. But the job is by no means completed, nor are there answers to all the problems. There are new plants to be tested and new methods of establishment and maintenance to be tried. There is work to be done in every governmental jurisdiction in the country. ♦

Landforming

On uneven fields where landforming is not practiced, water runs off the high areas and collects in shallow depressions.

Diversions and ditches lead flood water safely through Oregon town

By George Hamlin
Soil conservationist, SCS, Harrisburg, Oreg.

Farmers, city people, and Government agencies pooled their resources to lick floods on farm and city property at Harrisburg, Oreg., on the east bank of the Willamette River. City and school district officials, representatives of the Linn-Lane Soil and Water Conservation District, the Harrisburg Planning Commission, and the Soil Conservation Service all had an interest in the project.

A series of meetings was held at which a project and ways to cost-share its construction were discussed.

A tentative commitment was obtained for Federal matching funds to 70 percent of the cost for that part of a project which qualified as agricultural land. It was pointed out that this was a special pilot project that emphasized additional fringe benefits to go along with the basic argricultural conservation benefits.

A cooperative project

On the local front, 28 cooperators signed the working agreement with about half of them contributing to the financing of the project. The county court, city of Harrisburg, the Union High School and Grade School districts, as well as individuals contributed to the project.

The project consisted of a system of open and closed ditches and pipes laid out to divert part of the water before it entered town and to speed up flow of water that went through town.

The diversion was simply an interceptor ditch that cut off flow from the south and carried it west into the Willamette River. This water had to pass through a dike south of town. A culvert with a floodgate was installed to let the water flow out when the river is below the culvert and stop water from flowing back when the river rises above the pipe.

The rest of the system is a series of open and closed ditches and pipes designed to carry the rest of the load with extra capacity when the floodgate on the diversion is closed.

More than 3,900 feet of open ditch and 7,400 feet of tile were installed. The tile ranged from 6- to 24-inch concrete. Two catch basins, three inspection basins, and one floodgate were included in the project.

Rural and urban benefits

The areas benefited included 620 acres of cropland, 104 acres of pasture, 160 acres of residences and commercial property, 30 acres of school land, and two churches on 6 acres. There are 12 farms in the watershed with from 10 to 200 acres each; city residents numbered 32 and schools two. Much of the pipeline was installed on or adjacent to the school's athletic fields and playgrounds for health and safety reasons.

The initial part of the project was tested when a storm dumped 3.31 inches of rain in 24 hours. The system was designed for 1.75 inches. Four to eight inches of water flooded some areas, but no property damage was reported.

Recently, a new, larger tile was added to the system, along with more interceptor ditches, to speed up removal of surface water flowing through town. Also screens covering inlet structures were changed to prevent clogging by wood chips from trains. A sloping screen that allows chips to slide up as the water rises solved this problem.

Total cost of the project, designed by the Harrisburg Work Unit of the Soil Conservation Service, was about $15,000. The Government shared $9,380 of the cost through its Agricultural Conservation Program. The rest, nearly $6,000, was borne locally. ♦

Pinon-juniper sales pay for clearing

Selling fire logs and seedling trees of pinon pine and juniper, which have invaded deep soils on his rangeland, is proving to be profitable for Joe Crump, cooperator with the Upper Huerfano Soil Conservation District in Colorado. He is also a participant in the Great Plains Conservation Program.

The pinon pine and juniper needed to be removed from several hundred acres of bottom land on Crump's cow, calf, and sheep ranch to improve the range.

He has sold fire logs to camps in a summer resort area near Walsenburg, in Denver and Colorado Springs, and in Garden City, Kans.

He sells seedling trees to nurseries from Denver and Colorado Springs. The buyers come to the ranch and ball the trees for ornamental purposes.

Mr. Crump has cleared some 200 acres of land, bulldozed branches from the trees into gullies to prevent further erosion, and broadcast native grass seed over the entire area. Enough trees have been sold to pay for removing the brush.—JOSEPH J. ALESSI, *work unit conservationist, SCS, Walsenburg, Colo.* ♦

Agri-Business Complex

The agri-business complex now engages three-tenths of all employed persons in the United States. ♦

Great Plains Program helps group control erosion

Farmers and ranchers working together and using assistance from the Great Plains Conservation Program are a hard combination to beat when it comes to solving difficult soil and water conservation problems.

An outstanding example of success through cooperation can be found in the Cottonwood Group in the Cap Rock Soil and Water Conservation District of Texas.

This group consists of five individuals who own about 12,212 acres of range and cropland in Briscoe County. All have Great Plains Conservation Program contracts, and all are within a small watershed. Land treatment in the group could not be applied satisfactorily except in sequence, farm by farm, from the top of the watershed down.

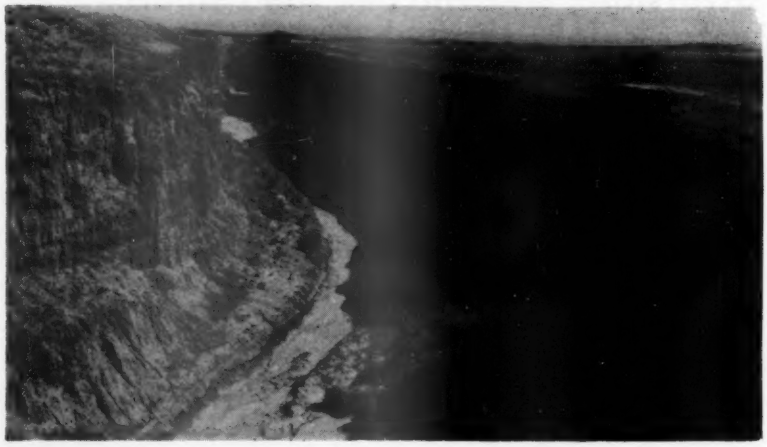
All work has been done since February 16, 1960, when E. A. Birdwell, who farms at the top of the watershed, signed his Great Plains Conservation Program contract. Most of the application work in the group is completed.

In addition to the land treatment for each acre of land, the complete treatment will control a huge gully in the lower part of the drainage area that local people call a "baby grand canyon." Control of this gully was one of the jobs that could not be done without the combined efforts of the group.

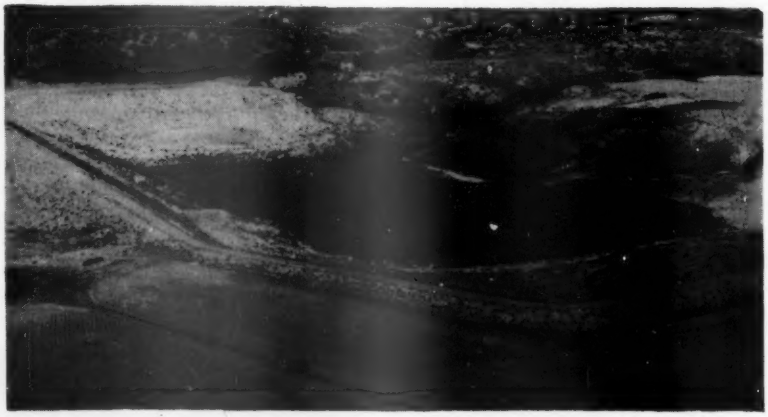
Included in the Cottonwood Group in addition to Birdwell are Walter Graham, J. T. Rogers, Jr., Gerald Smith, and J. R. Stroup. Together they operate 1,526 acres of cropland and 10,686 acres of rangeland, a total of 12,212 acres.

In their joint conservation program, they have built 44.8 miles of terraces, 2.6 miles of diversions, four ponds, and two erosion-control dams; installed five livestock water facilities; and completed 3,168 acres of brush control.

One of the erosion-control dams also serves as an irrigation reservoir holding water to irrigate about 320 acres. The structure will reduce flooding in the watershed.



The "baby grand canyon" in the Cottonwood watershed is being brought under control by dams on the upper reaches and grade stabilization downstream. The large irrigation reservoir on the Walter Graham farm withstood heavy flooding and has produced many unexpected benefits such as springs developing in the creek below and grass growing shoulder high in the valley.



A pooling arrangement was executed and signed by all the producers. The agreement (1) specified the benefits each producer would receive and the distribution of the Great Plains Program cost-sharing payments, and (2) defined the maintenance responsibilities of each producer participating. The agreement was filed in the county clerk's office for a permanent record.

Total cost-shares paid by the Great Plains Conservation Program on all practices in the watershed will amount to about $28,277 or $2.30 per acre. The contribution made by the group far exceeds the expenditures made by the Great Plains Conservation Program. Besides a lot of money, each individual has donated equipment, labor, and time in planning and applying the permanent conservation measures.

Also, each one carries out the management practices that supplement the applied treatment.—JAMES D. ABBOTT, *assistant State conservationist, SCS, Temple, Tex.* ♦

Tommy Johnson (left) shows SCS Work Unit Conservationist Yoakum the peanuts he planted on the protected flood plain below floodwater-detention structure.

Flood control benefits farmer

Experience gained working on upstream flood-prevention structures gave Tommy Johnson of Pontotoc County, Okla., a good understanding of how they are built and how they can stop flooding in a watershed. It also made him glad he has structures on his own farm in the Leader-Middle Clear Boggy Creek Watershed Project.

Johnson now has two flood-control reservoirs on his 160-acre Leader Creek farm. He rents three other farms on the flood plain, and he estimates that the reduction in flood damages will amount to around $5,000 annually in benefits to him. The structures control about 2,240 acres of drainage area.

Many of Johnson's friends, neighbors, and relatives enjoy the good fishing provided by the 6- and 20-acre permanent pools of the two lakes. The Johnsons themselves haven't done much fishing, but the success of other fishermen has recently made them eager to try their own luck.

"The men from the Soil Conservation Service helped me develop a conservation plan for my farm in cooperation with the Pontotoc County Soil and Water Conservation District," says Johnson. He added that he urged others to support the district program.

Walter Woolley, Jr., conservation district supervisor, encouraged Johnson to grant necessary easements so the lakes could be built.

Mr. Johnson says, "I was reluctant to give the needed permission, but Woolley would have a lot harder time now, if he needed my permission to have the structures removed." — KENNETH YOAKUM, *work unit conservationist, SCS, Ada, Okla.* ♦

Improved grasses to mend range

Improved grass strains developed by the Soil Conservation Service have been put to work to restore a unique area of rangeland in one of the largest extinct volcanic craters in the world.

The Baca Land Cattle Company is testing 14 varieties of grass to find the ones best suited for reseeding former cultivated land in Valle Grande, a beautiful valley of the crater in the heart of the Jemez Mountains in northern New Mexico.

About one-third of the ranch area is open pasture, with the rest in timbered mountain slopes. The growing season is short—120 days or less—but the summer range offers near-perfect conditions for growing steers.

When Pat Dunnegan and his associates purchased the ranch, they promptly undertook a soil and water conservation program. Soil Conservation Service technicians, working with the Jemez Soil and Water Conservation District, assisted Dunnegan develop his plan, and a good start has been made in applying conservation practices.

A former owner of the ranch had tried farming part of the valley, and about 600 acres were plowed and planted for several years. Crop choices were limited because of the short growing season and cool summer nights.

After the farming venture was abandoned, inferior grasses and weeds covered much of the plowed land. Too many sheep and cattle kept out the better forage.

Improving the vegetation was given a high priority in the conservation plan. Because there was little information based on local conditions of the unique area, a plan was developed to establish trial plantings on the site.

District Supervisors Simon Garcia (left) and Telesfor Gonzoles examine hay produced on the trial planting of intermediate wheatgrass in Valle Grande.

A 13-acre plot was selected and seeded to promising grasses.

Sample clippings have been made twice a year since 1964 to determine which grasses produced the most forage. Intermediate wheatgrass consistently produced higher yields than all others and had higher protein content.

By the spring of 1965 a decision had been made to plant 600 acres of Greenar and Amur strains of intermediate wheatgrass and alfalfa. In 1966 another 200 acres was planted with the same mixture.

The higher elevations on the ranch were little used because of poor water distribution and lack of cross fences. To improve the grazing, 20 stock water ponds were built, and more are planned. Also, several miles of cross fences have been planned.

Deer and elk appear happy with the new forage and the watering holes.—RICHARD L. BARBER, *work unit conservationist, SCS, Bernalillo, N. Mex.* ♦

Meetings . . .

Grassland conservation among topics at stockmen's convention

More than 2,000 stockmen from about 42 States will gather in Oklahoma City January 21 to 24 for the 71st Annual Convention of the American National Cattlemen's Association.

Marketing, "consumer reaction," legislation, nutrition and production research, and sound range management will be among the major topics considered by the ranchers, breeders, and feeders in committee sessions and speaking programs.

SCS Administrator D. A. Williams will appear on the general program. He will discuss the importance of conservation and development of grazing lands to stockmen, communities, and the Nation. Persons interested in soil conservation or beef cattle production need not be members of the association to attend.

Wool growers talk of rangeland use

Improving the sheepman's bargaining position at the marketplace will be the topic of discussion at the 103d annual convention of the National Wool Growers Association, January 28-31, in Dallas, Tex.

Other topics include sheep production research, promotion and advertising, public land use, rangeland conservation and development, predator control, and labor problems.

Dr. Charles W. Jarvis, the "Flying Dentist" of San Marcos, Tex., will head the speakers at the annual banquet on January 30.

About 800 delegates from across the Nation are expected to attend the convention.

Dates and places

January 21-24, American National Cattlemen's Association, Oklahoma City, Okla.

28-31, National Woolgrowers Association, Dallas, Tex.

February

4-8, National Association of Soil and Water Conservation Districts, Dallas, Tex.

11-16, American Road Builders Association, Las Vegas, Nev.

11-16, American Society of Range Management, Albuquerque, N. Mex.

17-21, American Association of School Administrators, Atlantic City, N.J.

21-23, American Pulpwood Association, New York, N. Y.

21-23, Land Improvement Contractors of America, Sioux Falls, Iowa.

The Potomac. BY THE POTOMAC PLANNING TASK FORCE. *1967. U.S. Dept. of Int. 103 pp., illus.; square album format. $5.00.*

Subtitled "A Report on Its Imperiled Future and a Guide to Its Orderly Development," this document was prepared for the Secretary of Interior by a group of distinguished men assembled by the American Institute of Architects.

It is one of several supplementary studies made in response to the President's directive to the Secretary to review past planning efforts in the Potomac Basin and develop a plan for the preservation and orderly development of the basin's resource "as a model of scenic and recreation values for the entire country." The comprehensive report based on all the studies is expected to be submitted to the President early in 1968.

Although the charge to the task force suggested a review of all facets of the basin's resources, the group wisely confined most of its attention to the "mounting pressure on the few remaining natural amenities."

The report gives passing consideration to water resource and agricultural problems. The accent here is mainly in relation to the metropolitan area and some other centers of population in the basin, with minor attention to the needs of the people in the smaller upstream areas.

In discussing the need for broad land use planning in the basin, the task force wisely argues that decisions should be based on inventories of streams, lakes, and aquifers and studies of terrain and soils that would indicate the areas best adapted to agriculture, forestry, recreation, and water production. It was seemingly unaware, however, of the substantial amounts of

information about these items already available from detailed studies that have been going on for years.

It is evident that the group was on more familiar ground in dealing with the problems of the urban Potomac, described as the "critical 30 miles" centered in the Washington metropolitan area. The report suggests a number of specific actions to preserve and enhance the riverside. The Georgetown and Anacostia waterfronts, for example, could be redeveloped with continuous promenades along the river's edge, and a system of long narrow converging parks adapted to mobile forms of recreation.

The report contains some pertinent observations about the relationships of highways and river crossings to the scenic values of the riverside. It suggests that arterial highways be located well away from the river to relieve the pressures for development. Parkways for pleasure driving should be set back, using spur roads to exploit the scenic resources of the area.

The task force estimates that future suburban expansion will significantly alter the Potomac landscape for a distance of 35 miles from the center of Washington, about three or four times the present radius. Zoning is regarded as essential to orderly development. Large and well-selected natural areas should be preserved within the metropolitan district which will accommodate the increasing population in residential clusters and new towns. Agriculture must have its appropriate place in the basin with due regard to proper management of other resources, and the report also suggests some new forms of zoning to protect farmlands and forests. It says:

"Management of development is mainly the responsibility of State and local governments, but they should respond to enlightened concepts that replace the inadequate and misguided development controls now in effect."

The ingredients for a desirable environment can no longer be taken for granted. Pure air, clean water, quiet open spaces, and a balanced community have a price tag. Accordingly, the question of the Potomac's future comes down to how much are we willing to pay for what we agree is desirable.

To this end the task force recommends that a Potomac Development Foundation be established, to be headed by an administrator appointed by the President and assisted by a planning staff and an officially appointed professional advisory board. It would not be a construction, operation, or management agency but would provide stimulus, leadership, and expert advice in all phases of planning in the basin.

In the view of the task force, planning and proposals for development of the basin's resources have been largely piecemeal and uncoordinated in the past. "We believe it is necessary," the report says, "to view the river from a unifying point of view. If this can be done, hundreds of pressure groups and special interest organizations may be able to work together. Otherwise limited viewpoints will prevail and the river environment will continue to be a byproduct of tugging and hauling, bickering and controversy."—CARL D. FETZER, *River Basins Division, SCS, Washington, D.C.*

Outdoors USA: 1967 Yearbook of Agriculture. *1967. USDA. 408 pp., illus. $2.75.*

Outdoors USA, the 1967 Yearbook of Agriculture, is designed for all who care about the quality of their environment—citizens concerned about the conservation and protection of natural resources, hunters and fishermen, campers and hikers, young people learning about the outdoors, and landowners interested in income-producing recreation. This is an exceptionally attractive yearbook, well illustrated with both color and black and white photographs.

In the press premiere introducing *Outdoors USA,* Secretary of Agriculture Orville L. Freeman said, "*Outdoors USA* is indicative of the broad conservation functions of the Department of Agriculture. It is the latest salvo in our battle to rejuvenate and revitalize all of rural America for all our people."

In the foreword, the Secretary writes that the Department is "moving forward with bold new actions to restore, conserve, and wisely use our natural heritage and maintain it for future generations." Secretary Freeman also noted that about half the Department's staff works in some phase of conservation to preserve natural resources while getting the most use from them.

Soil Conservation Service personnel authored 28 of the more than 100 articles dealing with adventure, beauty, and the people involved in outdoor activities. The four major headings are: "The Big Woods," "Water," "Beautification," and "The Countryside," with a wide variety of titles to arouse your curiosity, such as "More Crawfish for the Gourmet," "Small Watersheds Make a Big Splash," "Shunpiking Is For Fun," and the like.

Regardless of your conservation interest, whether you are on the firing line or the support staff, a soil conservationist or a specialist, a hunter or a hiker, a camper or a photographer, you will find numerous articles in *Outdoors USA* to engross your attention.—CHARLES G. PHILLIPS, *Resource Development Division, SCS, Washington, D.C.*

New publications

Our American Land. BY SOIL CONSERVATION SERVICE. *1967. USDA Agr. Inf. Bull. 321. 29 pp., illus. $0.20.*

Our American Land provides a much-needed updating of the soil conservation story and the part of the Soil Conservation Service in it. It gives the SCS employee a

publication that he can use to tell his public the kind of job he has and the kind of crusade he is in. It explains briefly how SCS got started, what the Nation's soil and water conservation problems are, and what is being done about them.

This publication relates briefly the history of soil erosion through the development of this young Nation. "To the pioneers our land seemed unlimited . . . We tend to think of their migrations as exploitation . . . but the pioneer farmer had to cut the timber and plow the sod to produce food."

Conservation districts are discussed enough to relate their development and growth to SCS as a Federal action agency that works right on the land with the land users and operators.

Soil surveys, soil and water conservation practices, small watersheds, and farm and ranch plans are treated concisely.

Our American Land suggests a look into the future. It points out that, while America's farmers are producing food more abundantly than any others on earth, they are not doing so without cost to the land; much of our high crop production comes at a high cost in soil washed and blown from the fields.

The booklet touches also on SCS's role in orderly urban expansion and community development and on the increasing pressures for land for other nonfarm uses. Conservation is a program not for farmers alone but for the entire Nation.

Evaluating Flood Prevention in Upstream Watersheds With an Areal Point Sample. By Gordon Sloggett and Neil R. Cook. *1967. USDA Econ. Res. Serv. ERS-353. 24 pp., illus.* An interim report, it describes progress acheived to January 1, 1967, toward evaluating the major economic benefits of flood prevention on 11 watersheds in the central part of the Washita Basin, and is limited to data collected in 1964-65.

The Agricultral Research Center. *Revised 1967. USDA Agr. Inf. Bull. 189. 36 pp., illus. $0.30* An updating of a familiar descriptive pamphlet.

Soil Conservation Service. *1967. USDA PA 818. 8 pp., illus.* A folder telling briefly the functions of the SCS and presenting something of its background.

A center-spread map shows the area served through soil and water conservation districts, and the general locations of other SCS activities: resource conservation and development projects, Great Plains Conservation Programs, and watershed projects of various types.

Food and the Land. *1967. Soil Conserv. Soc. Amer. Ankeny, Iowa. 16 pp., illus. $0.25.* A cartoon booklet in color presenting the soil and water conservation story in the world food crisis. This is another of the cartoon booklets published by the Society as part of its effort to provide educational tools in the conservation programs underway on the land in the United States, Canada, Puerto Rico, Mexico, and elsewhere.

Fertilizer Use in the United States, By Crops and Areas. By D. B. Ibach and J. R. Adams. *USDA Econ. Res. Serv. Stat. Bull. 408. 384 pp.* 1964 estimates.

Open Space Land, Planning and Taxation. By John E. Rickert, with the collaboration of Jerome P. Richard. *1965. Urban Renewal Administration, Housing and Home Finance Agency. 58 pp. $0.40.* A selected bibliography.

Soil Surveys

Warren County, Tennessee. By George T. Jackson, Samuel R. Bacon, James F. Brasfield, Donald B. Freeman, and Ival D. Persinger. *1967. 79 pp., illus.; maps 4 inches to the mile (1:15,840).*

Adams County, Washington. By Charles D. Lenfesty. *1967. 110 pp., illus.; maps 3.17 inches to the mile (1:20,000).* Fieldwork by Charles D. Lenfesty, Roy H. Bowman, Jesse J. Newlun, Dale L. Olson, Norman C. Donaldson, Dale E. Snyder, Ronald D. Iverson, and Robert A. Hardin.

Bremer County, Iowa. By Russell L. Buckner. *1967. 118 pp., illus.; maps 4 inches to the mile (1:15,840).* Fieldwork by Russell L. Buckner, Edward L. Bruns, Garwin T. Carlson, William L. Fouts, Wayne D. Frederick, Ellsworth M. Richlen, David F. Slusher, Kermit D. Voy, Wayne Arnold, James S. Brasfield, and J. Millard Soileau.

Randolph County, Alabama. By William B. Parker. *1967. 69 pp., illus.; maps 4 inches to the mile (1:15,840).* Field survey by William B. Parker, Billy D. Batchelor, Oliver R. Carter, Lewis A Dungan, and Harold L. Mathews.

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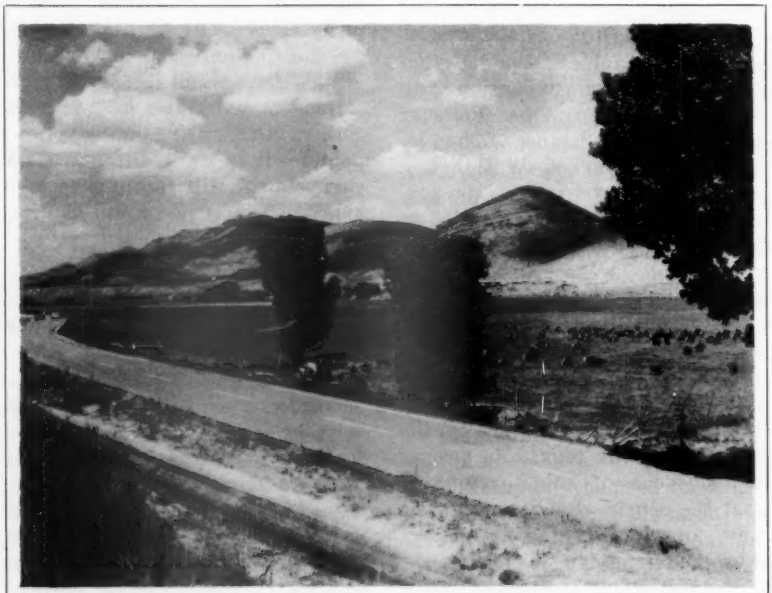

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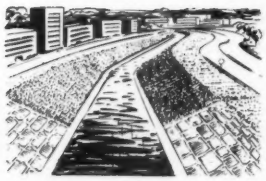
From the Administrator:

The Erosion Threat to Water Resources



Sediment is by all odds the major pollutant in the Nation's water supply. Studies on the Potomac River Basin show that gross erosion in the basin is more than 50 million tons annually. Of this amount, 2.5 million tons are discharged in the Potomac estuary. The estimated costs of dredging this sediment is $0.90 to $1.25 a ton.

The discharge of sediment into water supplies was formerly considered to result from erosion on farmlands. It is recognized now that unprotected roadsides, unstabilized streambanks, unreclaimed surface-mined lands, and rural-fringe areas—particularly areas of new construction—are major sources of sediment pollution.

Excessive sediment is harmful to essentially all beneficial uses of water. The costs for filtration of water for domestic and industrial uses generally exceed all other costs. Sediment smothers and inhibits aquatic life and greatly reduces the recreation potential of the Nation's lakes, streams, and reservoirs.

Water moving over and through the surface soil picks up natural salts and mineral substances. Drainage from acid mine wastes is an example of this type of pollutant. The pH of water in streams which carry mine drainage is consistently below 5 and frequently 3 or lower. The Monongahela River in West Virginia and Pennsylvania is acid over its entire 129-mile length and contributes, on the average, the equivalent of 200,000 tons of sulfuric acid a year to the Ohio River at Pittsburgh.

Streams in arid and semiarid regions may have large quantities of salt from the lands they drain. Samples of water from the Pecos River in Texas show concentrations as high as 15 tons of dissolved salt per acre-foot of water during low flows.

What does all this mean to us in the Soil Conservation Service? No one has answered the question better than Secretary of Agriculture Freeman. In *Resources in Action: Agriculture/2000* he said:

"Pure air, clean water, stable soils, productive crop, pasture, range and forest lands, abundant wildlife, natural beauty, and the opportunity for man to live in harmony with his natural environment are essential. They are interrelated and mutually supporting objectives. We commit ourselves to meet this great challenge, to continue our tradition of helping men throughout the world to help themselves, and to move forward with the bold new actions needed to restore, conserve, and wisely use our natural heritage and maintain it for future generations."

Fortunately, the Service has a wealth of experience and skill in dealing with soil, water, plants, and animals—the basic resource elements in our environment. Limited as the programs are for dealing with roadsides, streambanks, and surface-mined areas, we have knowledge and skills that can be applied to these sources of sedimentation and pollution.

All sources of sediment must have unified, coordinated attention if we are to overcome this threat to the Nation's water resources. Whether the sediment source is farmland, surface-mined land, roadsides, streambanks, or construction in rural-urban fringe areas, the greatest progress can be made when all interests, public and private, in a drainage area unite in their efforts. Attempts to deal with the problems piecemeal are costly and in many instances ineffective.

Moreover, the preventive measures to control erosion and sedimentation should not be taken without consideration of positive efforts for beneficial use of the lands involved. In most instances, the damages avoided can be matched by new values created by constructive conservation measures.

Much attention has been given in this country to the multiple use of land. This usually has meant *simultaneous* use of the same area for different purposes: camping on tree land, hunting on pasture or hayland, fishing in irrigation reservoirs, and the like. More consideration should be given to *sequential* multiple use: tree growing followed by surface mining for fuel or minerals followed by tree growing again, or by production of pasture and hay for livestock, or by recreation based on water developments or improved wildlife habitat.

By good planning and effective conservation of natural resources in the broadest sense, surface mining in most instances can be made compatible with later uses of affected land.

As soil conservation district supervisors, land use planning boards, and other local officials look to the future, these opportunities loom large.

Theirs is the responsibility to develop public understanding of the problems, the role of Federal, State, and local jurisdictions, and, most importantly, of the private sector in meeting head-on the challenges of the future.

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Colorado district guides growth of Ski Purgatory

Carefree skiers who schuss through the powder at Ski Purgatory in southwest Colorado aren't thinking of soil conservation. But, if one stopped to ask Raymond Duncan or Chet Anderson, ski enthusiasts and developers of the resort, they could tell him how Purgatory was developed according to a conservation plan.

Duncan and Anderson, as cooperators with La Plata Soil Conservation District of Durango, began work on the idea in the summer of 1965. SCS soil conservationists helped them plan and install a diversion ditch to intercept a small creek and transport it without erosion from the ski slope area.

By the fall of 1965, the clearing of trees and brush from ski slopes and trails had opened the way for soil erosion. The second job, then, was to establish grass as a protective cover over all of the skiing areas. Whirlwind seeders were used to dispense smooth bromegrass and intermediate wheatgrass on the steep slopes. A break in the weather resulted in good growing conditions during 1966, and now summer visitors, who ride the chairlift, look down on slopes carpeted with green grass.

Plans for the near future include a lake stocked with trout and picnic facilities for tourists who would rather visit Purgatory during the summer than tackle the slopes when the snow starts falling.

Cooperation between the district and the resort will continue in the future as more areas are cleared and ski slopes developed to handle the growing crowds of visitors.

A plan for year-round recreation at Ski Purgatory, north of Durango, Colo., will extend this slope's invitation to skiers into the summer for picnickers.

By the end of the 1966-67 ski season, Purgatory has had 64,000 visitor days. Of this number, 54,000 were ski days. Along with local visitors, people came from Arizona, California, New Mexico, Texas, Oklahoma, and Utah.

Ski Purgatory has done much to help the economy of Durango, especially by bringing in business during the winter months. The manager of a prominent hotel stated that December was so busy he was unable to get away to ski.—EUGENE MCGUIRE AND ROBERT GRIFFIN, *work unit conservationist and area conservationist, SCS, Durango, Colo.* ♦